IN THE CLAIMS

Please amend claims 1 and 9 and add new claims 17-20 as follows:

1. (CURRENTLY AMENDED) A method for conducting magnetic resonance tomographic microscopy comprising:

placing a non-crystalline sample under the influence of a static polarizing first magnetic field;

introducing a radio-frequency field perpendicular to the first magnetic field;

obtaining two or more magnetically resonant spins of the sample simultaneously by sequentially angularly rotating, around a prescribed axis, the sample with respect to a ferromagnetic sphere having a second spatially dependent magnetic field; and

reconstructing an image of the sample based on a signal obtained from the magnetically resonant spins using computerized tomography.

2. (ORIGINAL) The method of claim 1, wherein the sample comprises a small molecule, protein, cell or other biological material of interest.

3. (ORIGINAL) The method of claim 1, wherein the sample is about $1/10^{th}$ a size of the ferromagnetic sphere.

4. (ORIGINAL) The method of claim 1, wherein the reconstructing is performed by a Fourier transform filtered backprojection algorithm for parallel projections of the magnetic resonance spins from the ferromagnetic sphere through the sample.

5. (ORIGINAL) The method of claim 4, wherein the reconstructing is performed by a Fourier transform of a radon transform, multiplication by a ramp function |k| in conjugate space, followed by an inverse transformation, and integration over all angles in accordance with:

$$\rho(y,z)=\int_0^{\pi}\left\{\int_{-\infty}^{+\infty}\left[\int_{-\infty}^{+\infty}P_\phi(q)\cdot e^{i2\pi kq}dq\right]|k|e^{-i2\pi kq}dk\right\}d\phi$$

where ϕ is the angle between the sample and ferromagnetic sphere and q is the prescribed axis.

6. (ORIGINAL) The method of claim 4, further comprising correcting for nonlinear projection distortion prior to a first step in the Fourier transform filtered backprojection alogrithm.

7. (ORIGINAL) The method of claim 4, further comprising:

deconvolving each projection from a Lorentzian line shape prior to performing the Fourier transform filtered backprojection; and

performing a linearization prior to performing the Fourier transform filtered backprojection.

8. (ORIGINAL) The method of claim 1, wherein the sample is placed with respect to the ferromagnetic sphere wherein contours of the second magnetic field from the ferromagnetic sphere are perpendicular to the sample, but vary slightly in an intersecting radius of curvature.

9. (CURRENTLY AMENDED) An system for conducting magnetic resonance tomographic microscopy comprising:

a static polarizing first magnetic field ;

a non-crystalline sample under an influence of the first magnetic field;

a radio-frequency field perpendicular to the first magnetic field;

a ferromagnetic sphere having a second <u>spatially dependent</u> magnetic field, wherein two or more magnetically resonant spins of the sample are simultaneously obtained by sequentially angularly rotating, around a prescribed axis, the sample with respect to the ferromagnetic sphere; and

a computer configured to reconstruct an image of the sample based on the obtained magnetically resonant spins using computerized tomography.

10. (ORIGINAL) The system of claim 9, wherein the sample comprises a small molecule, protein, cell, or other biological material of interest.

11. (ORIGINAL) The system of claim 9, wherein the sample is about $1/10^{th}$ a size of the ferromagnetic sphere.

12. (ORIGINAL) The system of claim 9, wherein the computer is configured to reconstruct the image using a Fourier transform filtered backprojection algorithm for parallel projections of the magnetic resonance spins from the ferromagnetic sphere through the sample.

13. (ORIGINAL) The system of claim 12, wherein the computer is configured to reconstruct the image using a Fourier transform of a radon transform, multiplication by a ramp function |k| in conjugate space, followed by an inverse transformation, and integration over all angles in accordance with:

$$\rho(y,z)=\int_{0}^{\pi}\left\{\int_{-\infty}^{+\infty}\left[\int_{-\infty}^{+\infty}P_{\phi}(q)\cdot e^{i2\pi kq}dq\right]|k|e^{-i2\pi kq}dk\right\}d\phi$$

where ϕ is the angle between the sample and ferromagnetic sphere and q is the prescribed axis.

14. (ORIGINAL) The system of claim 12, wherein the computer is further configured to reconstruct the image by correcting for nonlinear projection distortion prior to a first step in the Fourier transform filtered backprojection alogrithm.

15. (ORIGINAL) The system of claim 12, wherein the computer is further configured to reconstruct the image by:

deconvolving each projection from a Lorentzian line shape prior to performing the Fourier transform filtered backprojection; and

performing a linearization prior to performing the Fourier transform filtered backprojection.

16. (ORIGINAL) The system of claim 9, wherein the sample is placed with respect to the ferromagnetic sphere wherein contours of the second magnetic field from the ferromagnetic sphere are perpendicular to the sample, but vary slightly in an intersecting radius of curvature.

17. (NEW) The method of claim 1 wherein the second magnetic field has an azimuthally symmetric dipolar form of:

$$\vec{B}(\vec{r}) = \frac{3\vec{n}(\vec{m}\cdot\vec{n}) - \vec{m}}{|\vec{r}|^3}$$

where *n* is a unit vector that points from a center of the ferromagnetic sphere to a location of the non-crystalline sample and *m* is a magnetic moment vector of the sphere.

18. (NEW) The system of claim 9 wherein the second magnetic field has an azimuthally symmetric dipolar form of:

$$\vec{B}(\vec{r}) = \frac{3\vec{n}(\vec{m}\cdot\vec{n}) - \vec{m}}{|\vec{r}|^3}$$

where *n* is a unit vector that points from a center of the ferromagnetic sphere to a location of the non-crystalline sample and *m* is a magnetic moment vector of the sphere.

19. (NEW) The method of claim 1 wherein only a z-component of the second magnetic field is included when considering the resonant spins in accordance with:

$$B_Z(\vec{r}) = \frac{M_0}{|\vec{r}|^3}(3\cos^2\theta - 1)$$

where θ is an angle between a z-axis and a distance vector r, and M_0 is a magnitude of a saturation magnetic moment of the ferromagnetic sphere.

20. (NEW) The system of claim 9 wherein only a z-component of the second magnetic field is included when considering the resonant spins in accordance with:

$$B_Z(\vec{r}) = \frac{M_0}{|\vec{r}|^3}(3\cos^2\theta - 1)$$

where θ is an angle between a z-axis and a distance vector r, and M_0 is a magnitude of a saturation magnetic moment of the ferromagnetic sphere.